

SOUTH DAKOTA

Statewide Communications System

LRC Summer Study Request to Address
Underserved Areas and P25 Upgrade Schedule

Agenda

Request 1 - System Coverage

1. Brief history of system
2. System improvements made over the past 13 years
3. Challenges faced for additional buildout
4. What our current user breakout looks like

Request 2 – System Upgrade

1. Overview of system components
2. Radio communications system standard – P25
3. Lifecycle planning
4. Vendor options & cost for South Dakota

Before the System

Incompatible Radio Systems Used by Public Safety

- State agencies utilize radios in three different frequency bands, most agencies that required inter-department communications had three different radios installed to communicate. No organized coordination with locals.
- Local agencies also used those three different frequency bands without coordination to state or other local entities. Communication to other entities also required additional radios installed.
- Tribal and Federal agencies utilized system on their own frequency allocations, in many cases there was no communications between those agencies and others.
- Emergencies typically required dispatching of staff and deployable systems to coordinate communications on site between responders.

The Tipping Point, Spencer Tornado



1998

State and local responders showed up on site with incompatible radios. This was a life-safety situation and most responders could not communicate with others outside of their own agency.

Result?

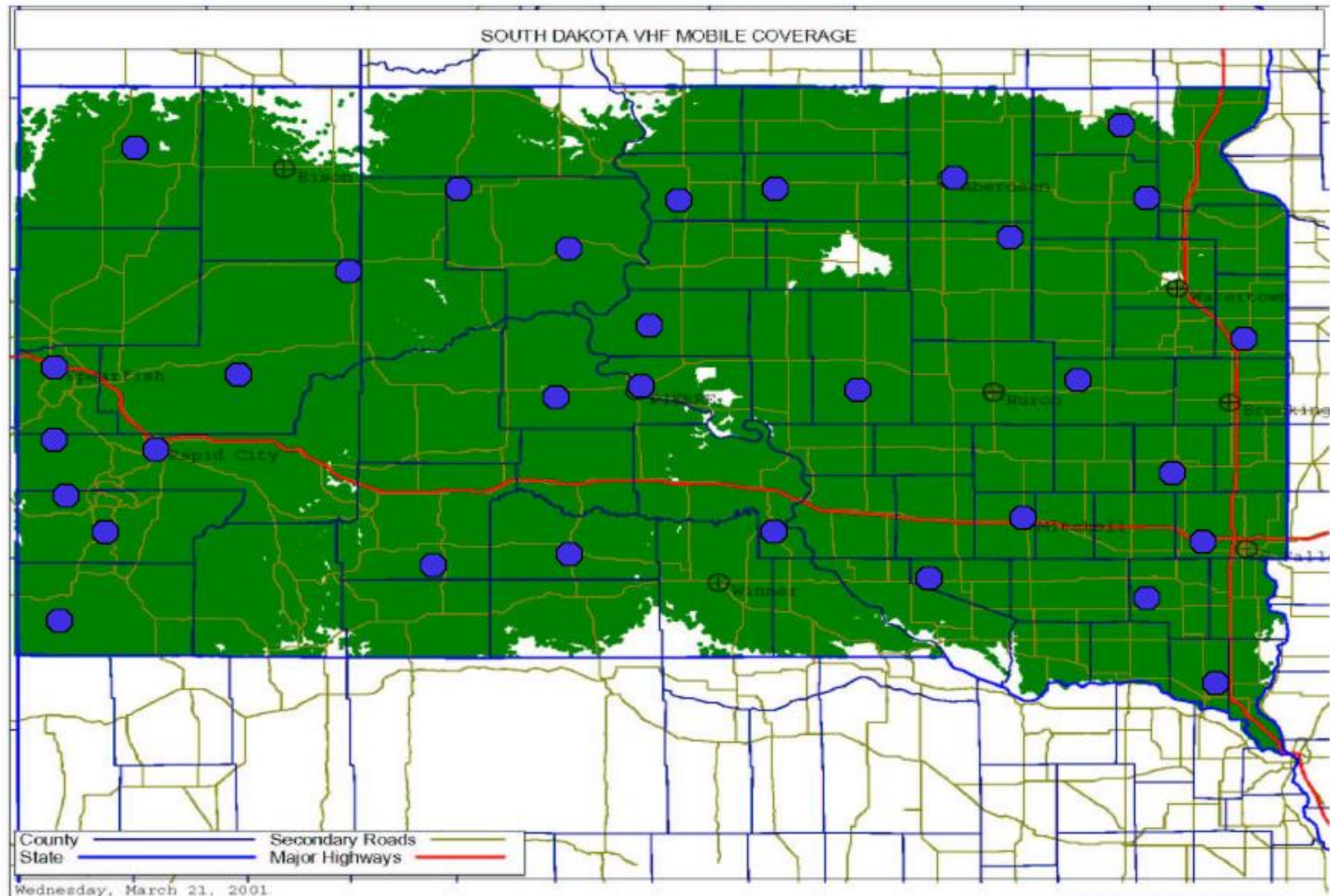
No coordinated communications. Governor Janklow ordered a deployable system in and handed out radios. This is the lowest level of emergency interoperability as currently defined by DHS.

Decision to Upgrade

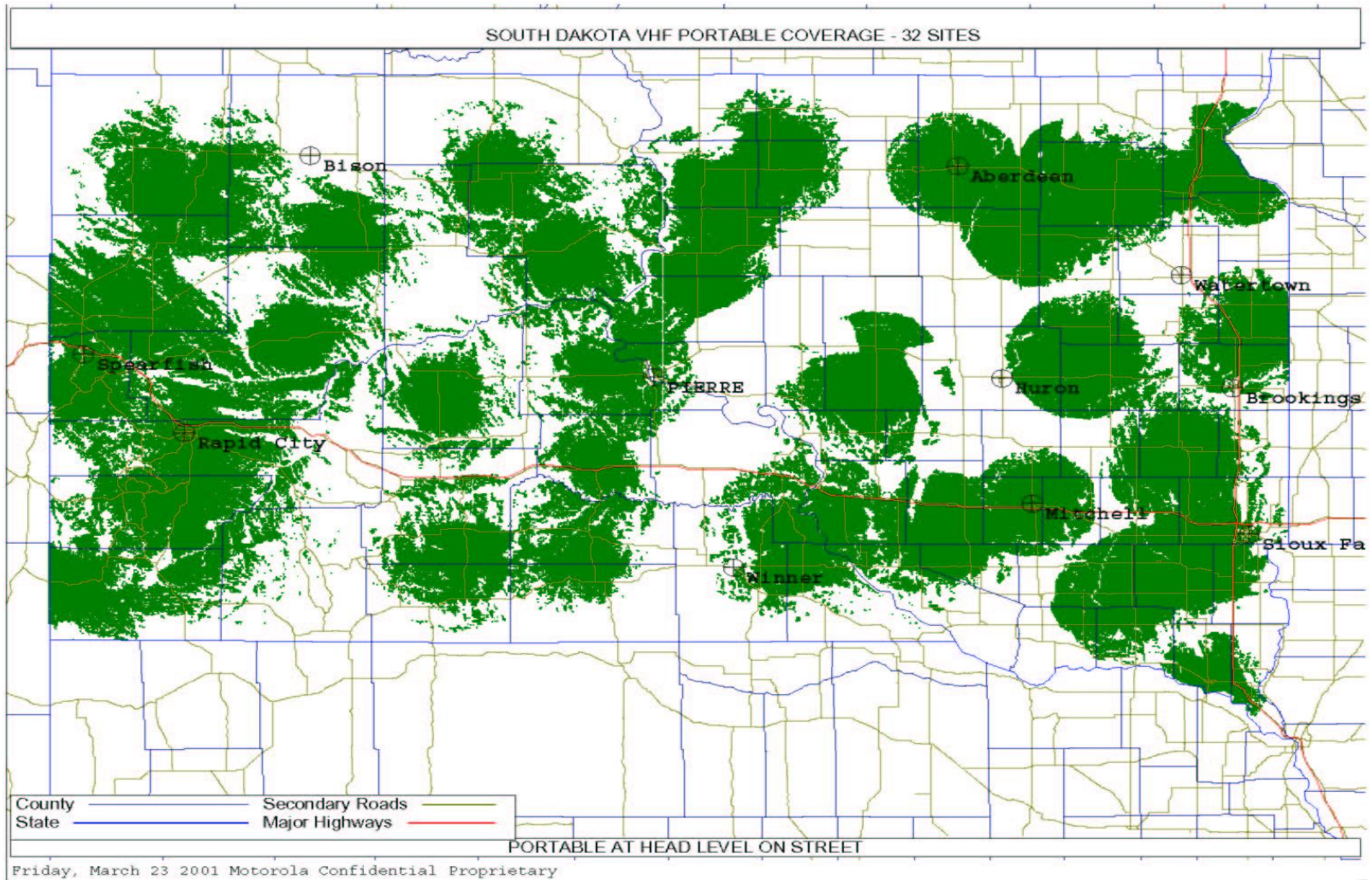
- Legislative action in 1999. HB1292 directed the 8 state agencies using radio communications to integrate into a common system, initial scope was expanded by the Governor to include local agencies.
- 1999 to 2000 decision process.
- 2000 to 2002, system design, built master site & first 5 sites for testing.
- 2002-2003, finish buildout of initial 35 sites.

System was designed to provide the maximum area coverage with the minimum of sites. Vendor claims that we are still the only entity to request a budget-based system, as opposed to an objectives-based system.

Original Mobile Coverage



Original Handheld Coverage



Continue to Expand

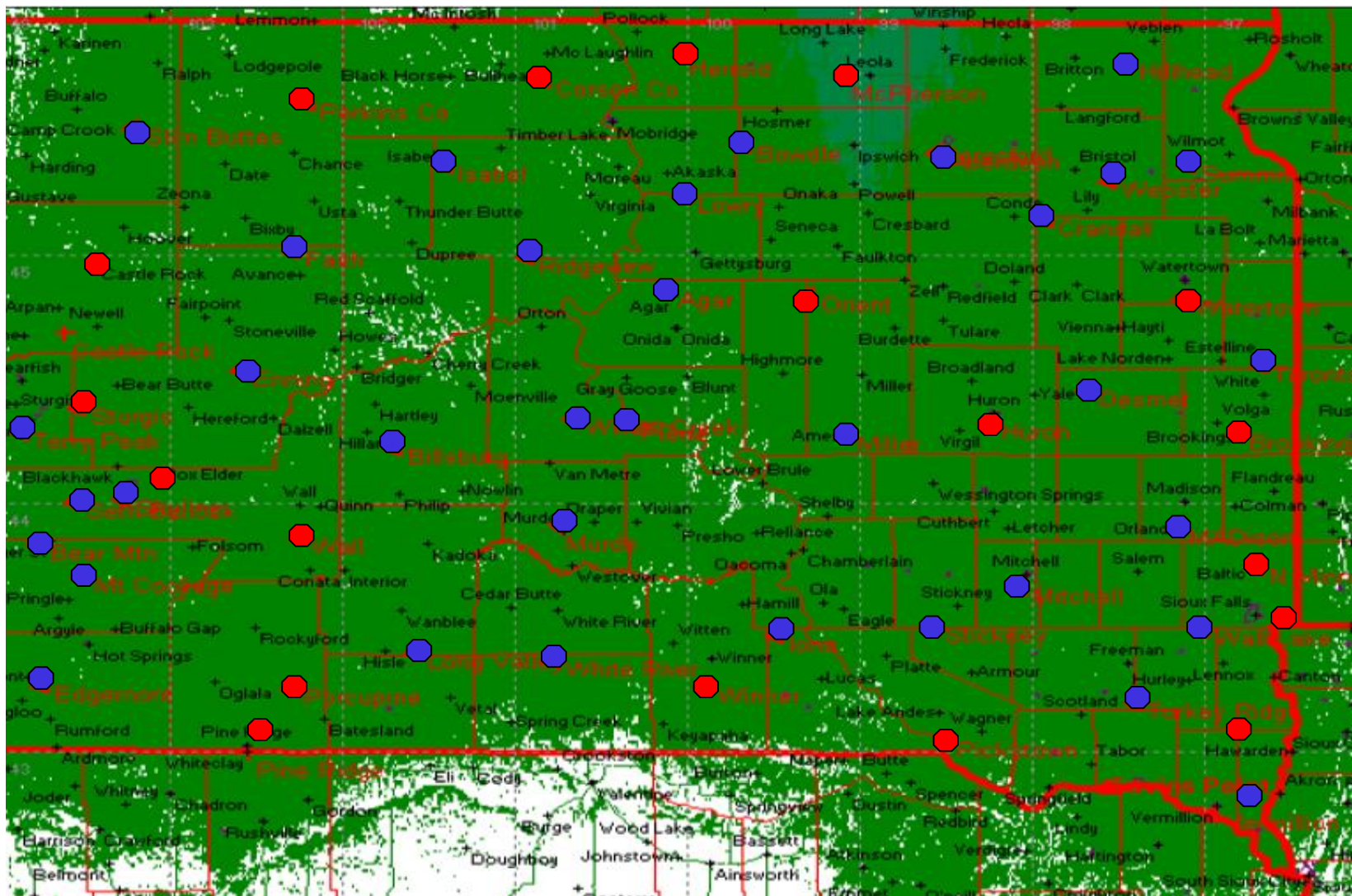


- 2003-2004, Corson, Charles Mix, Baltic, Perkins County(DHS Funds), SF Simulcast (3 sites, local funds), Watertown, Brookings, Huron, Yankton (CDBG funds)
- 2005-2007, Wall, Winner, Butte County, Beresford, Herreid, Orient, Sturgis (DHS funds).
- 2008-2013, Porcupine and Pine Ridge (BIA funds), RC Simulcast (2 sites, local funds)
- 2014 McPherson County, (Local/DHS/SRC project)

Sites Relocated for Better Service

- Murdo, from I-90 site in Murdo to site north of town, much higher elevation
- Yankton County site from Gayville to Federal tower across river from Yankton
- Pierre, from old DCI building to Mickelson building, much higher elevation

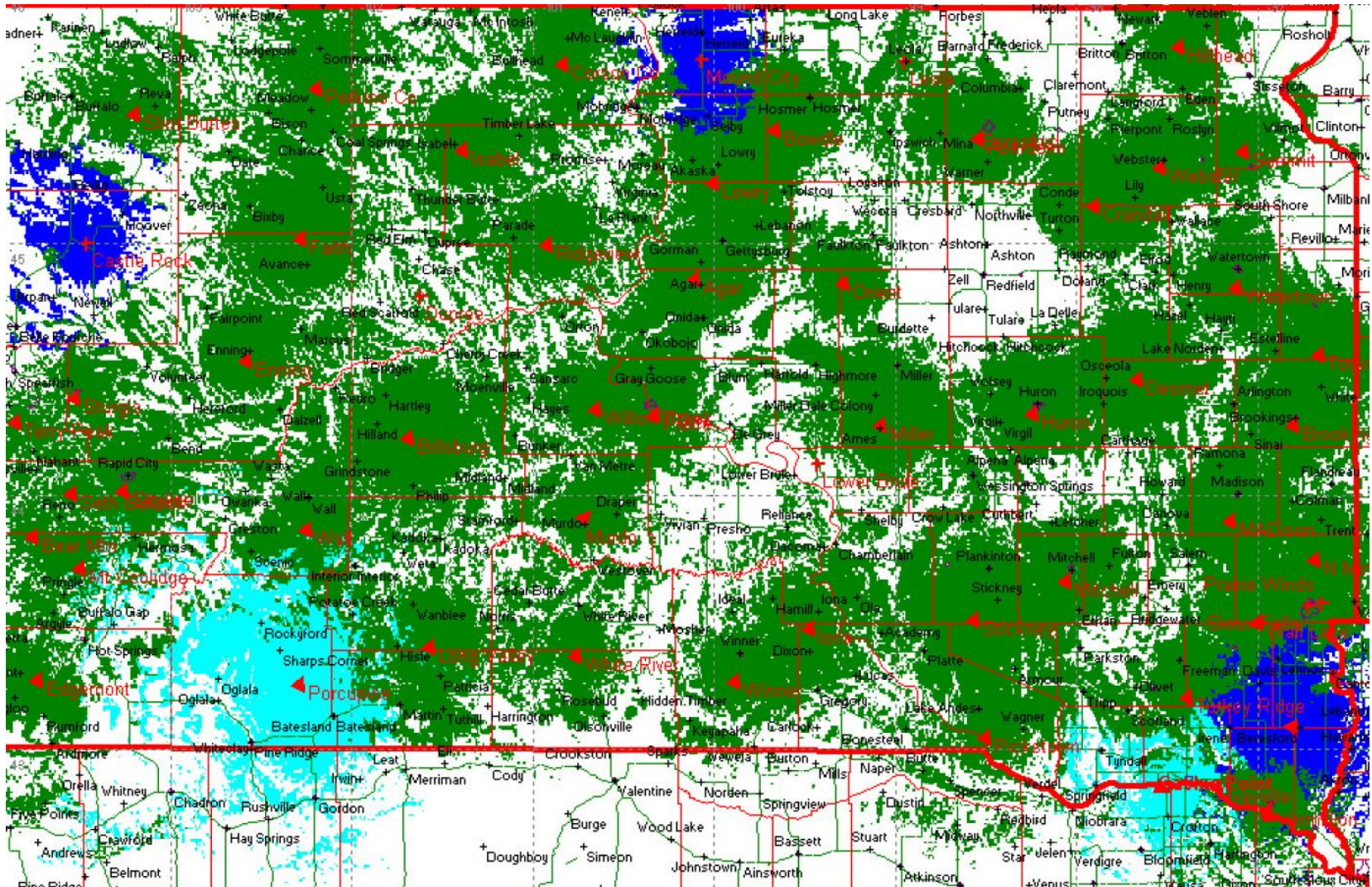
Current Mobile Coverage



● Original 35 sites, 85% geographic coverage

● Additional 22 sites, appx. 98% geographic coverage.

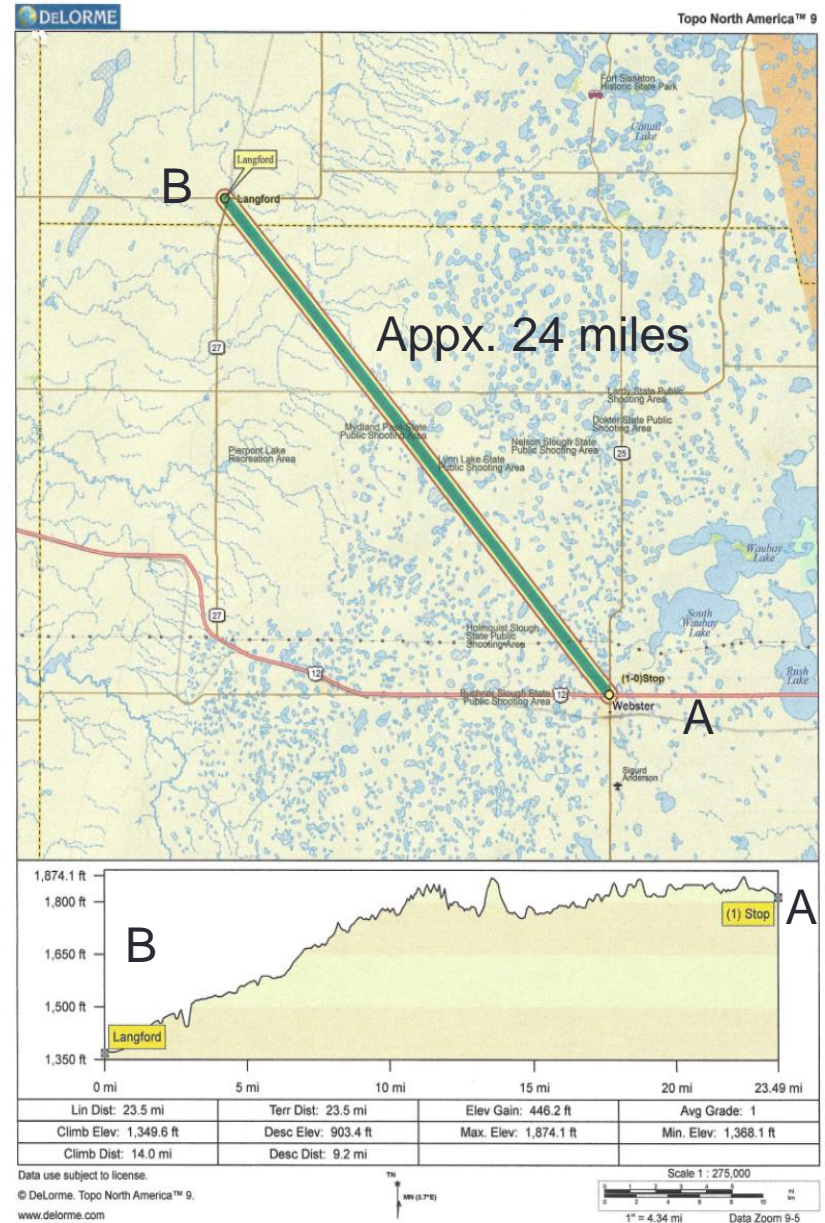
Handheld Radio Coverage



Factors Affecting Coverage

- Topography -- Radio waves do not sharply bend around hills or valleys.
- Site – equipment issues, antenna connections.
- Radio type -- Handheld 5 watts, mobile (vehicular) radio 45 watts.
- Subscriber condition – big factor. We manage around 1/3rd of radios on the system. Condition/programming of radio, and antenna condition have a major impact on interaction with system. We cannot control that element.

Topography Example



Factors Affecting Further Buildout

- DHS grant funds are 1/10th of what they were at peak, primary funding source
- 2012-2014: Major upgrades were required to the Master Site and dispatch centers at Pierre, Huron, Rapid City, Sioux Falls, and Watertown. Site electronics also were replaced to keep equipment within vendor support. This fully involved staff.
- 2012-2014 upgrades require an additional \$200k in support because of the move to an IP-based system. We now have the same software updates and security requirements associated with data networks.
- Coverage area investment. The McPherson County site turned up in 2014 covers approximately 1200 sq. miles, the proposed site in Union County will cover approximately 200 sq. miles. Outside of tower size, site costs are the same.

SDPSCC Designated Priority Sites

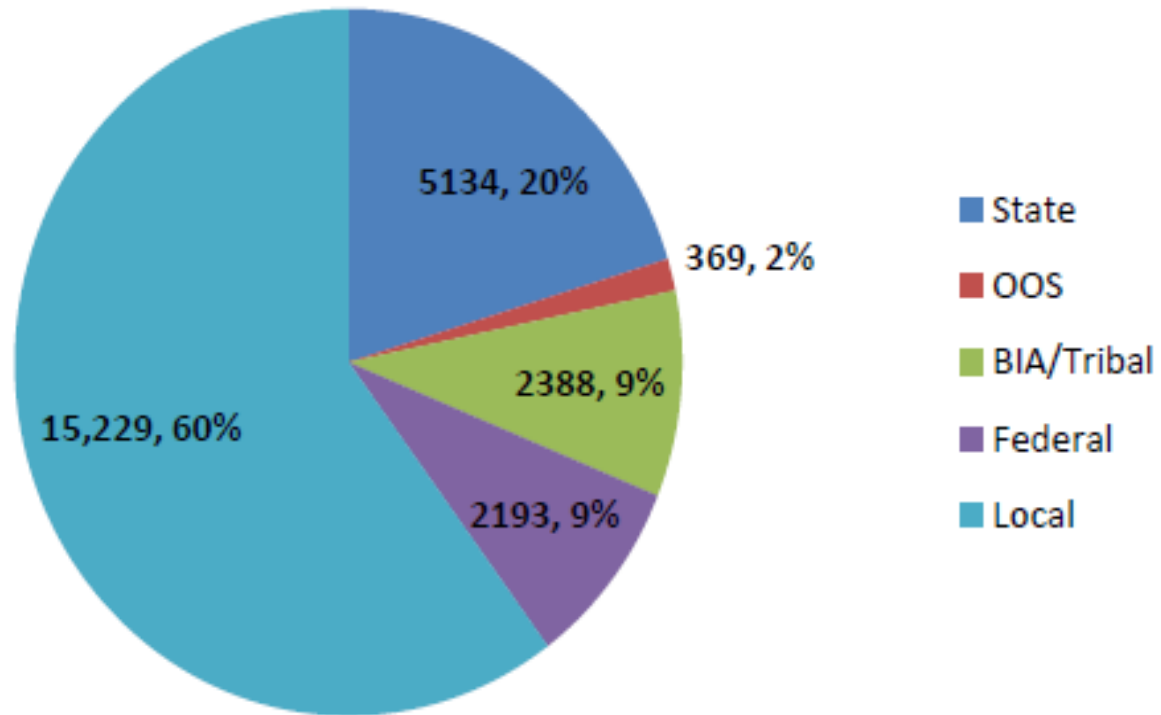
1. Union County – Southern end of Union County ~200 Sq. miles. HIDTA route, I-29, lots of commuter traffic.
 - Have tower in place, equipment quote, frequency study completed, site will take about \$300k to finish.
2. Northern Lyman County. Area north of I90 underserved. Have Reliance SDPB tower in place. Est. \$300k to install.
3. Fall River County. Very problematic areas along Hwy 18. We have Battle Mountain tower in place. Est. \$300k to install.

All three sites were brought to the attention of the council or a council member for consideration during a scheduled meeting. Factors such as area underserved, population, roads, crime, etc. are included in discussion and ranking.

This map of South Dakota displays county boundaries and names in red. Major cities are marked with black dots and labeled. Several locations are highlighted with circles:

- Yellow Circles:** Rapid City, Pierre, Spearhead, Watertown, and Rapid City.
- Red Circles:** Edgemont, Lower Eagle, and a small area near the bottom right corner.

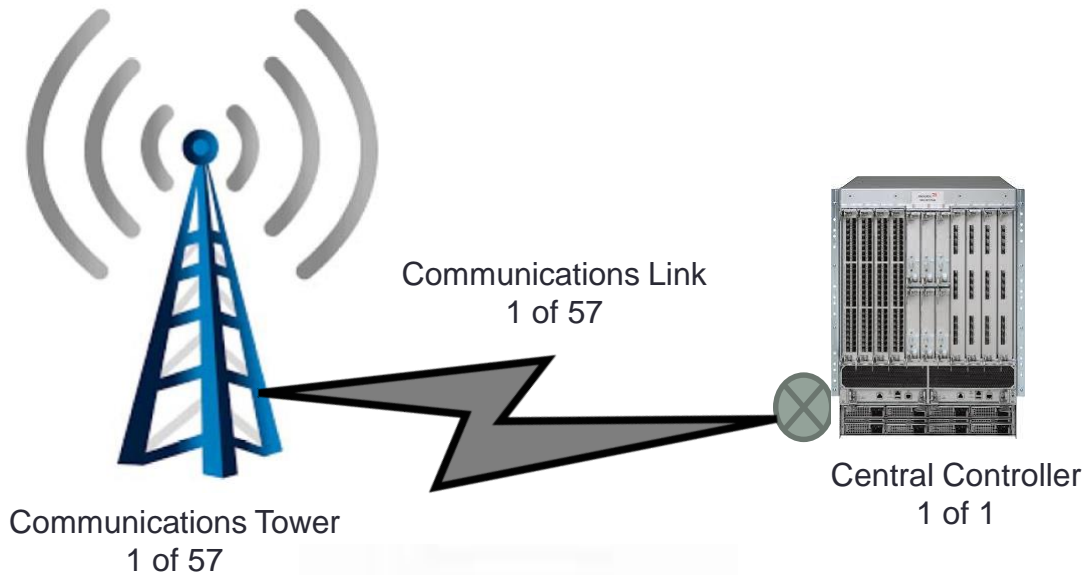
Radio System User Breakout



System Upgrade

P25

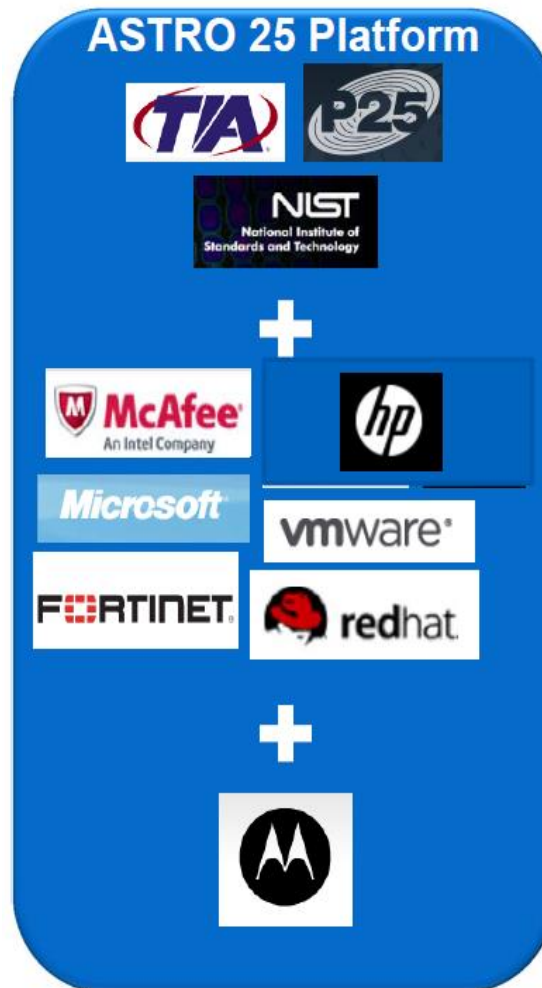
System Network Components



What is P25 ?

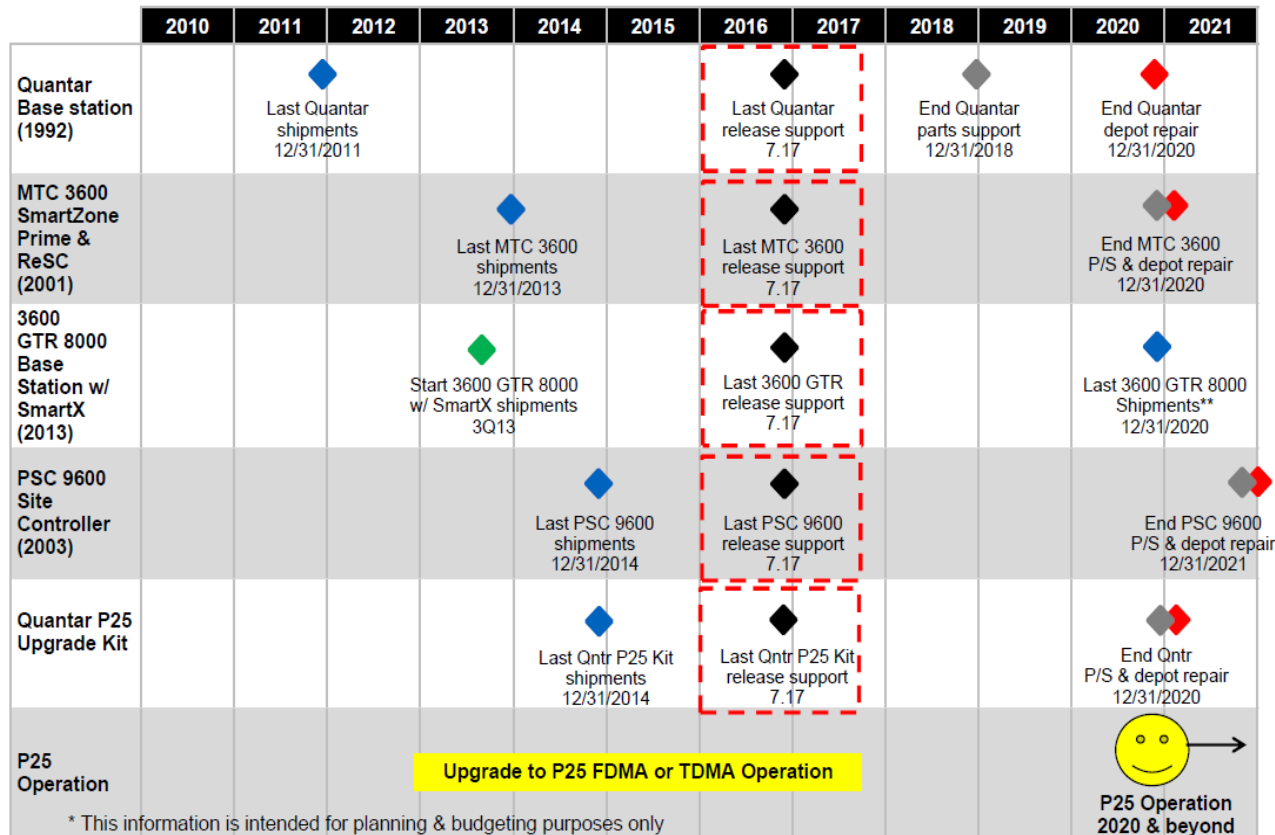
- Project 25 (P25) is a radio operating system and digital voice standard developed in 1989 through a coordinated effort by 6 national communications associations and federal agencies to address a lack of system interoperability between vendors equipment.
- The P25 standard is under constant review, type acceptance process, and has multiple vendors building product that is compatible. This is and will continue to be the national standard for public safety comms.
- P25 has two separate components: digital voice, and networking.
- When the South Dakota system process was started in 1999, the P25 operating system for the VHF spectrum had not been developed, but the digital voice standard was. A hybrid system of P25 voice and a Motorola proprietary networking was installed.

IP Radio Soup – Hardware, Software, Security

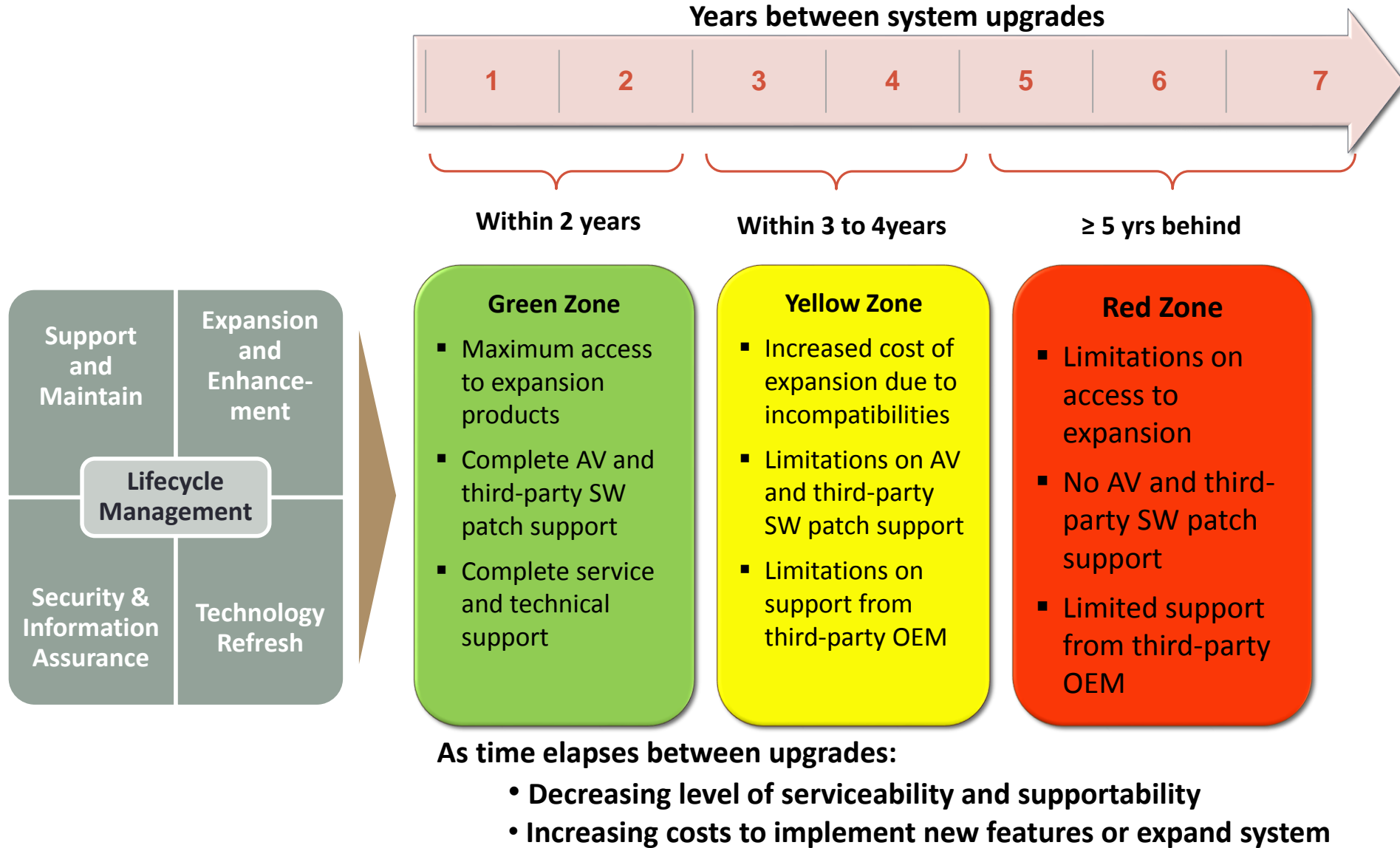


All System Components Have A Life Expectancy

SMARTZONE STATION MIGRATION via SMARTX LIFECYCLE



Lifecycle planning must take into consideration the trade-offs associated with elapsed-time between system updates



Life-Cycle Planning

- 2011, State Radio began lifecycle planning with vendor to ensure system support and allow for budgetary planning.
- 2012-2014, key system components were upgraded to ensure support and put state on path to P25 compliance.
- 2013, lifecycle planning meeting with vendor, we were told that system would be supportable as is until 2025. This date has been socialized to users and administration for past three years.
- 2016, notified by vendor that upgrade support for radios in use by most of the agencies on system would be discontinued after 2017. In most cases these radios were a generation upgrade from original radios. This brings into question our timelines and we are still examining options available to us.

Current Options

Option 1, Stay Current Path:

Benefits:

1. Utilize current functional system & subscriber configurations
2. Upgrade radios over next 5-7 years
3. Maintain current budget
4. Allows us time to see where industry is heading

Risks/Issues:

1. Non-supported component in system fails, puts network at risk
2. No idea of cost to upgrade network and radios in future
3. If industry has no other options, where are we?
4. We still have no plan to improve system coverage

Current Options

Option 2, Update System and Subscribers:

Benefits:

1. Allows us to leverage current radios until normal replacement
2. Vendor will be responsible for radio updating and programming
3. System will be standards-based
4. Future programming will be possible over-the-air
5. System will have full product and software support
6. We will have a plan in place to gradually fill coverage problems

Risks/Issues:

1. All or nothing process, all radios need to be updated before system can be
2. Cost of upgrade itself
3. Increased cost of vendor support
4. Can we support expanded system with current number of FTE?

Update Proposal

- Update 20,039 radios on system (vendor will supply resources)#1
- Update all sites on system#1
- Add Integrated Voice & Data (will allow remote programming) #1
- Upgrade MOSCAD site alarm & monitoring system #1
- Provide site equipment for up to 12 additional sites #2
- Provide towers, buildings, generators (finished tower site) #3

Quoted Cost 3-10-2016 = \$12,258,935 (system upgrade only) #1

Quoted Cost 5-19-2016 = \$16,796,286 (add site electronics) #1,2

\$21,599,379 (add complete site package) #1,2,3

or

7 years no interest = \$2,399,469/annually (add site electronics) #1,2

\$3,085,625/annually (add complete site package) #1,2,3

Est. to replace radios out of support = $20,039 \times \$3,767 = \$75,486,913$

Other Cost Considerations

- 12 Additional sites, support @ \$15,000 each = \$180,000
- Additional software, security, and technical support = \$80,000
- FTE, at some point we will need additional help to maintain sites.
- If sites are not available to build on, complete sites would have to be built greenfield. Land acquisition, permitting, environmental and historical studies, tower, building, telecommunications, possibly utilities, access road, generator, etc. Each project would be a design build because of the variables, very hard to average.